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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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David Wilson

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EXAMINER

MCGUTHRY BANKS, TIMA MICHELE

ART UNIT

PAPER NUMBER

1793

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03/14/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/531,649	<b>Applicant(s)</b> WILSON ET AL.	
	<b>Examiner</b> TIMA M. MCGUTHRY-BANKS	<b>Art Unit</b> 1793	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-32 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☒ Claim(s) 32 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. ____.                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>4/15/05</u> .   | 6) <input type="checkbox"/> Other: ____.                          |

## **DETAILED ACTION**

### ***Status of Claims***

Claims 1-32 are as currently amended.

### ***Drawings***

The drawings are objected to as failing to comply with 37 CFR 1.84(p) (5) because they include the following reference character(s) not mentioned in the description: 191, 455, 500, 502, 470, and 469. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

Claim 9 is objected to because of the following informalities: “step (e) effectuates the melt the lead” is unclear. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

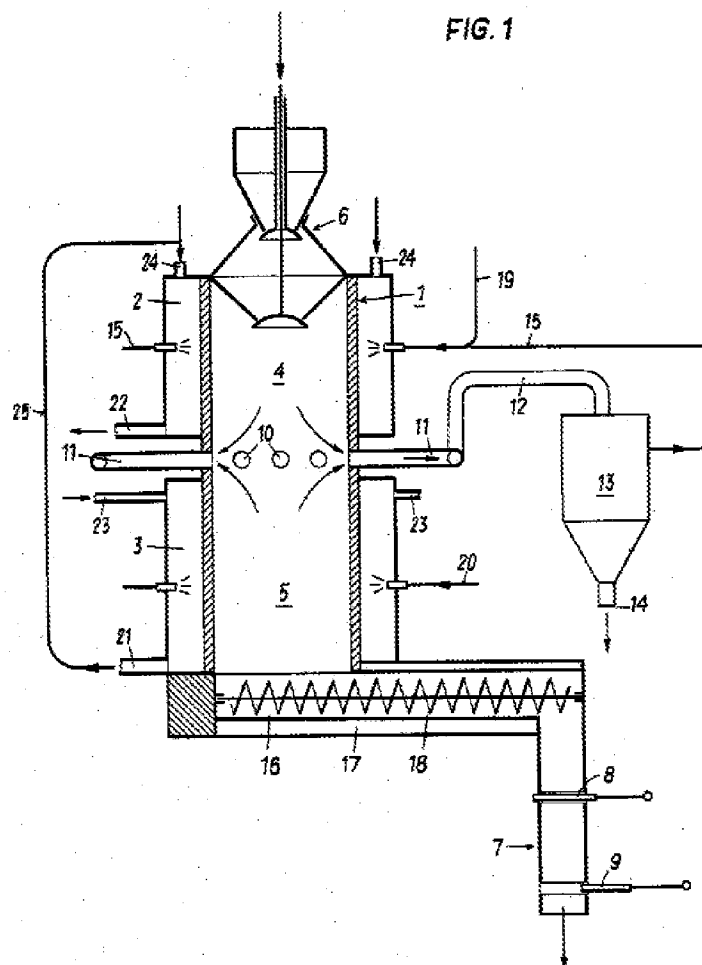
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 12, 13, 15 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Stift (4,384,886).

Stift anticipates the claimed invention. Stift teaches removing zinc from iron sources. The iron sources are in lump form, e.g. by pelletizing, briquetting, or kneading (column 6, lines 35 and 36). Iron sponge is formed (column 7, line 43). Zinc evaporates (lines 8 and 9) and is condensed (column 4, lines 59 and 60). Regarding Claim 2, the temperature is maintained sufficiently high between heating chambers for preventing immediate condensation of the withdrawn zinc (lines 9-12). Regarding Claim 3, separation of zinc is carried by reaction gases (line 56). Regarding Claim 4, the gas outlets are outwardly and downwardly inclined (lines 42-44); See also Figure 1. Regarding Claims 12 and 13, the iron sources can be pelletized. Regarding Claim 15, the amount of reducing agent is dependent on the amount of oxygen to be removed (column 6, lines 50-52). Regarding Claim 16, the process occurs in a furnace (column 5, line 39).

Claims 17-20 and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Stift.

Stift anticipates the claimed invention. Stift teaches a muffle shaft furnace as shown below:



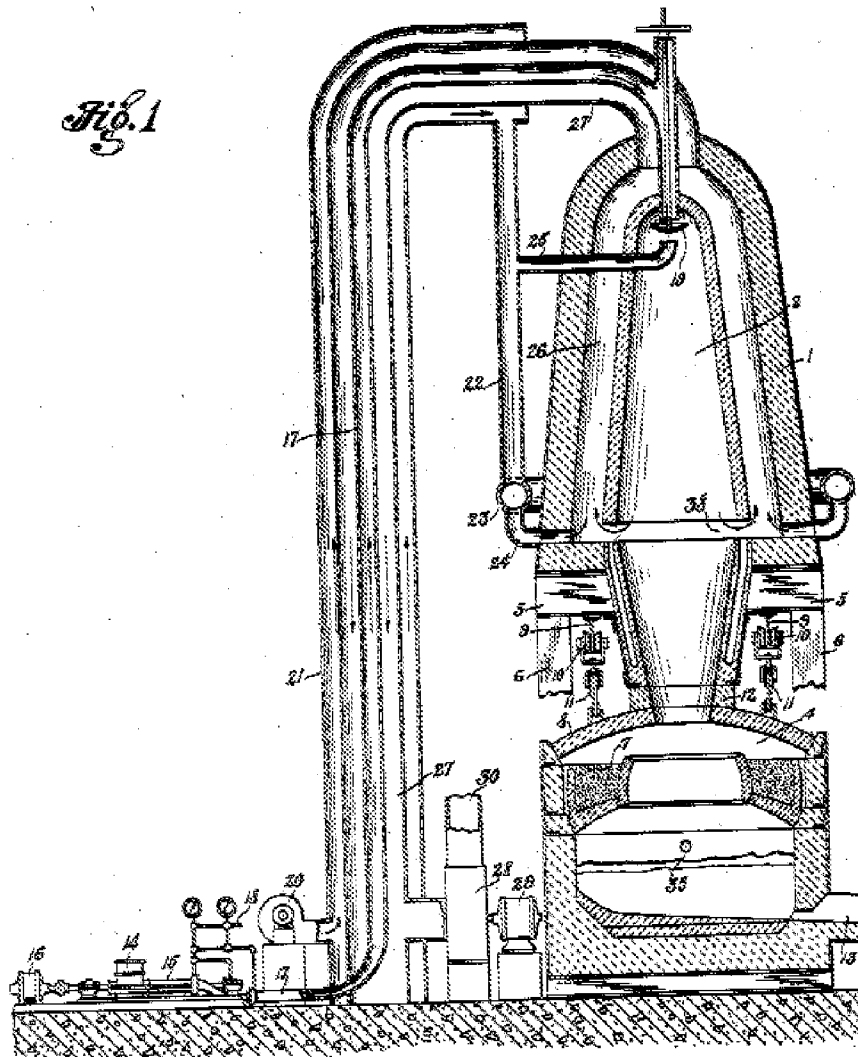
The first furnace chamber is read by 4, a first arrangement is read by 10-12, and a second arrangement is read by 13 and 14. Regarding Claim 18, to avoid condensation of zinc within the withdrawal conduits as well as within the downwardly moving furnace charge, the temperature prevailing there shall be higher than the evaporating temperature of the zinc. The zinc-containing gases are sucked off from below the depth of plane 28 (shown in FIGs 2 and 3) (column 7, lines 9-22). Regarding Claim 19, the arrangement is read by 11 and 12. Regarding

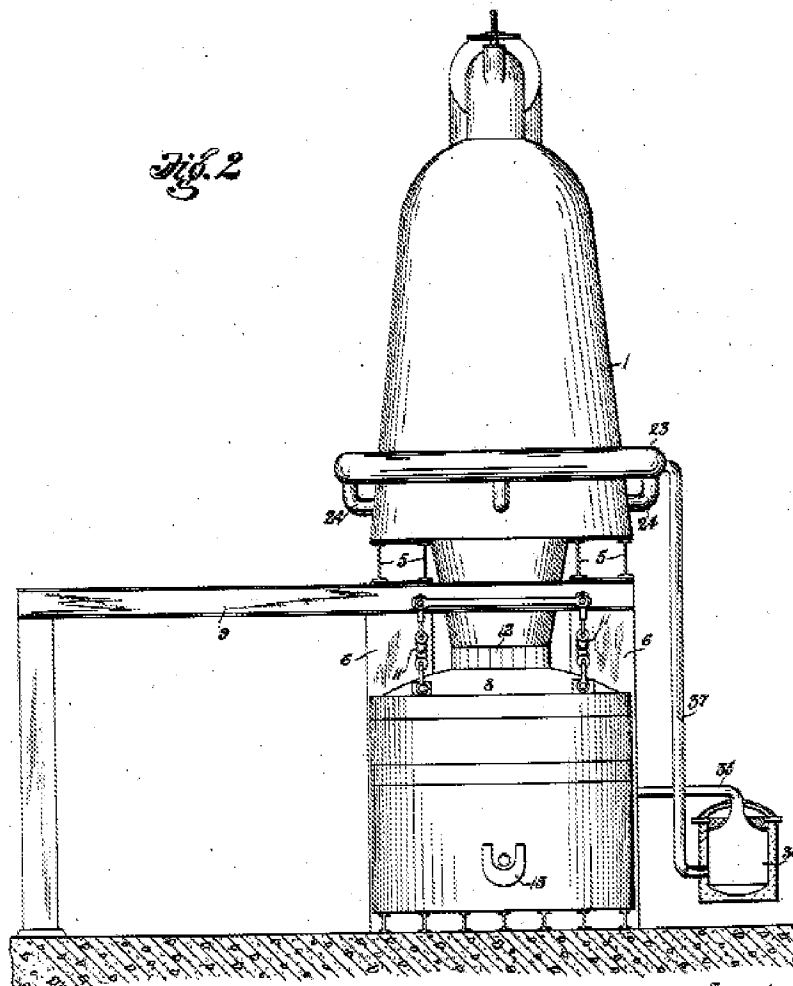
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Claim 20, this limitation is read by outlets 10. Regarding Claim 27, this limitation is read by 13 and 14.

Claims 17-19, 21-25 and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Baily (1,704,029).

Baily anticipates the claimed invention. Baily teaches a reduction process and apparatus as shown below in Figures 1 and 2:





The first furnace chamber is taught by 1, the first arrangement is taught by 24, and a second arrangement is read by 36. Regarding Claims 18 and 19, a third arrangement is taught by 23, 24, and 37. Regarding Claim 21, second furnace chamber is taught by 2 and the heating arrangement is taught by 4. Regarding the fourth arrangement, it is inherent that the molten iron would be recovered and cooled for further processing. Regarding Claim 22, remaining combustible gas is carried to the combustion chamber (page 1, lines 102-109). Regarding Claim 23, the fifth arrangement is taught by 13. Regarding Claim 24, the addition of another tap is mere duplication of parts has no patentable significance unless a new and unexpected result is

produced. See MPEP § 2144.04. Regarding Claim 25, it is inherent that reduced material is fed to the second furnace chamber by gravity. Regarding Claim 27, the cooling zone is taught by 36.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).



Claims 5-7 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stift as applied to claim 1 above, and further in view of EP 508 166.

Stift discloses the invention substantially as claimed. However, Stift does not disclose melting, recovering and cooling the iron as in Claim 5. EP '166 teaches making reduced iron pellets (DRI) with steel mill waste. The DRI is discharged to lined, insulated, and sealed containers and transported to a steelmaking operation, where it is melted and inherently cooled for use as a steel product (column 6, lines 32-50). It would have been obvious to one of ordinary skill in the art at the time the invention was made to further process the iron sponge as taught by EP '166, since Stift teaches making pig iron (column 1, line 27).

Stift teaches removing zinc from iron-containing sources, but does not specifically teach EAF as in Claim 10. EP '166 teaches removing impurities such as zinc, lead, and cadmium from metallurgical wastes (column 2, lines 38-40), such as EAF dust, BOF dust, mill scale or other steel mill wastes (column 3, lines 22-24). It would have been obvious to one of ordinary skill in the art at the time the invention was made to expect that EAF would be included in the steel mill dust taught by Stift, since EP '166 teaches the equivalence of steel mill dusts in the same endeavor.

Regarding Claim 6, Stift teaches that hot reaction gases can be recycled with a substantial use of their original heat content (column 4, lines 61-66). Regarding Claim 7, lime is added to the mill dust (column 1, line 9).

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stift in view of EP '166 as applied to claims 1 and 5 above, and further in view of Stockinger et al (US 6,264,725 B1).

Stift in view of EP '166 discloses the invention substantially as claimed. However, Stift in view of EP '166 does not specifically teach carrying out steps (a) and (e) in separate furnaces. Stockinger et al teaches a process for producing pig iron (abstract) and shown below:

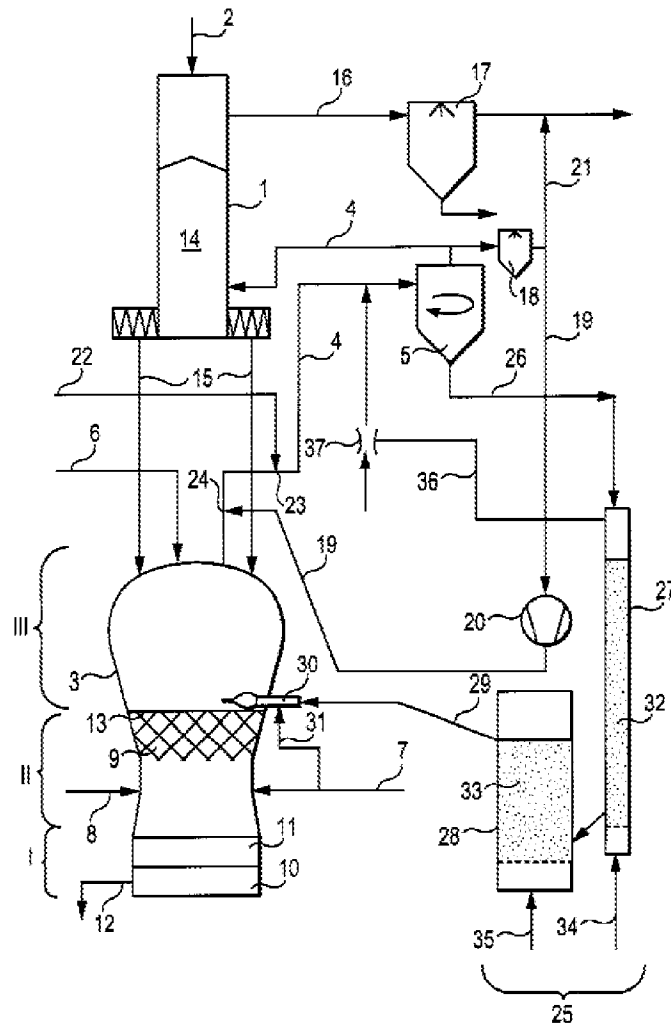


FIG. 1

Iron ore, which is reduced to sponge iron in shaft furnace 1, is supplied by means of discharge screws to melter gasifier 3 (column 4, lines 14-18). It would have been obvious to one of

ordinary skill in the art at the time the invention was made to convey the sponge iron produced in Stift to a melter gasifier as taught by Stockinger et al, since Stift teaches eventually producing pig iron from sponge (column 1, line 27), and Stockinger et al also teaches producing pig iron from sponge (abstract). The combination of the muffle shaft furnace of Stift and the melter gasifier of Stockinger et al would also yielded the predictable result of producing pig iron.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stift in view of EP '166 as applied to claims 1 and 5 above, and further in view of Matsuoka et al (US 5,139,567).

Stift in view of EP '166 discloses the invention substantially as claimed. However, Stift in view of EP '166 does not disclose melting, separating and recovering lead as claimed. Magsuoka teaches recovering valuable metals from a dust such as EAF dust (column 1, lines 6-9). Lead, which is present in EAF dust, is separated from molten iron by the difference in specific gravity (column 3, line 67 to column 4, line 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made that lead would be recovered in Stift in view of EP '166, since Stift does not teach volatilizing lead during sponge iron production, and the inherent properties of molten lead lend it to separate from molten iron.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stift as applied to claim 1 above, and further in view of Wetzel et al (US 3,647,417) or Wildman (US 2,014,873).

Stift discloses the invention substantially as claimed. However, Stift does not disclose using brown coal or peat as claimed. Wetzel et al teaches producing sponge iron using iron ore (column 1, lines 5 and 6), including materials such as the iron oxides resulting from cutting of steels, etc. (column 2, lines 11 and 12). It is preferred to use brown coal or similar solid fuels (lines 42 and 43). It would have been obvious to one of ordinary skill in the art at the time the

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invention was made to use brown coal in the process of Stift, since Wetzel et al teaches that these fuels have excessive amounts of volatile components (line 43). Alternatively, Wildman teaches producing sponge iron for conversion into pig iron or steel (page 1, lines 1 and 2). Iron oxides are reduced in the presence of peat humus (lines 16 and 17). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use peat in the sponge iron of Stift, since Wildman teaches that carbon derived from peat during the reduction process dissolves in iron only at temperatures above the melting point of the iron only at temperatures above the melting point of the iron and since the reduction temperature is kept below this point, the sponge iron produced is substantially free of dissolved or included carbon (lines 20-27).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stift as applied to claims 1 and 13 above, and further in view of Freeman.

Stift discloses the invention substantially as claimed. However, Stift does not disclose forming the pellet (pelletizing) by extrusion as claimed. Freeman teaches preparing sponge metal pellets. Ground iron oxide and binder are mixed and then shaped or extruded preferably in standard extrusion equipment. The extrusions are then sent to a pelletizer (column 3, lines 47-59). It would have been obvious to one of ordinary skill in the art at the time the invention was made that the pellets in Stift would be formed by extrusion, since Freeman teaches the use of an extruder to produce sponge iron pellets and these pellets are sufficiently hard to resist attrition in subsequent reducing and handling operations (column 4, lines 9-11).

Claims 21-25 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stift as applied to claim 17 above, and further in view of Stockinger et al.

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Stift discloses the invention substantially as claimed. Stift discloses a second furnace chamber 5, but does not disclose a heating arrangement and a fourth arrangement as in Claims 21, and 23-25. Stockinger et al teaches a shaft furnace above a melter gasifier as shown below in Figure 1.

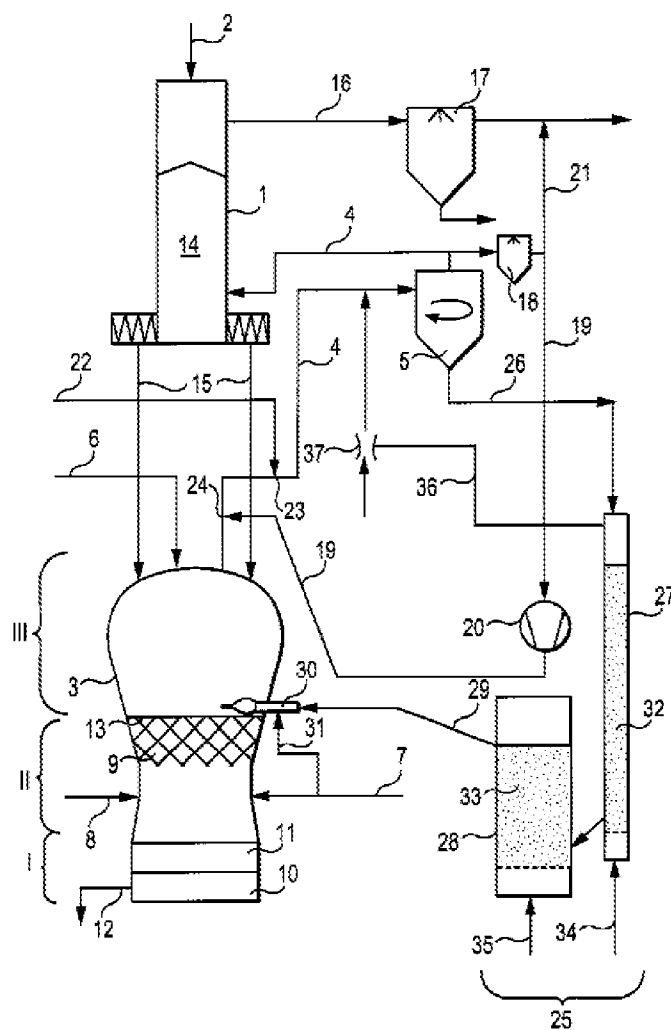


FIG. 1

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the muffle shaft furnace of Stift with the melter gasifier of Stockinger et al, since Stift teaches eventually producing pig iron from sponge (column 1, line 27), and Stockinger et al also teaches producing pig iron from sponge (abstract). The combination of the muffle shaft furnace of Stift and the melter gasifier of Stockinger et al would also yielded the predictable result of producing pig iron. Regarding Claim 23, Stockinger et al teaches a tap 12 (column 4, line 4). Regarding Claim 24, the addition of another tap is mere duplication of parts has no patentable significance unless a new and unexpected result is produced. See MPEP § 2144.04. Regarding Claim 25, the shaft furnace is above the melter gasifier.

Regarding Claim 22, Stift teaches that natural gas, methane and/or flue gas can be used as the fuel gas for conduits 19 and 20 (column 3, lines 62 and 63), but does not teach that the flue gas comes from further heating as claimed. Stockinger et al teaches recirculating reducing gas via line 4 to the shaft furnace (column 4, lines 26 and 27). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the recirculating reducing gas taught by Stockinger et al in the process of Stift, since Stift teaches using flue gas, and Stockinger et al exemplifies that it is well known to recycle the exit reducing gas stream to produce sponge iron.

Regarding Claim 27, Stift teaches a gas purifying and cooling means 13 (column 5, lines 46-49).

Claims 21 and 23-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stift as applied to claim 17 above, and further in view of Gordon et al (US 6,875,251 B2).

Stift discloses the invention substantially as claimed. Stift discloses a second furnace chamber 5, but does not disclose a heating arrangement and a fourth arrangement as in Claims 21 and 23-26. Gordon et al teaches a process for the manufacture of steel wherein the direct reduction furnace is "stacked" above the electric arc furnace so that the DRI can be fed to the electric arc furnace by gravity (abstract). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the muffle shaft furnace of Stift with the electric arc furnace of Gordon et al, since Stift teaches eventually producing pig iron from sponge (column 1, line 27), and Gordon et al also teaches producing pig iron from sponge (abstract). The combination of the muffle shaft furnace of Stift and the electric arc furnace of Gordon et al would also yielded the predictable result of producing pig iron. Regarding Claim 23, Gordon et al teaches steel and slag tapping in Figure 1. Regarding Claim 24, the addition of another tap is mere duplication of parts has no patentable significance unless a new and unexpected result is produced. See MPEP § 2144.04. Regarding Claim 25, the DRI is fed by gravity. Regarding Claim 26, the transformers for the electrodes are in outside of the furnace (column 4, lines 11-13).

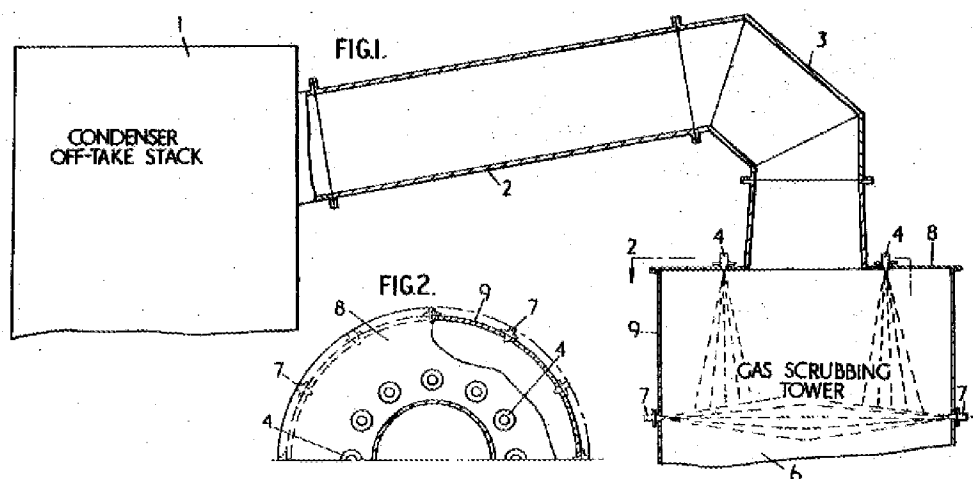
Regarding Claim 27, Stift teaches a gas purifying and cooling means 13 (column 5, lines 46-49).

Claims 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stift in view of Stockinger et al or Gordon et al as applied to claims 17 and 27 above, and further in view of Cattelain (US 3,592,631).

Stift in view of Stockinger et al or Gordon et al disclose the invention substantially as claimed. However, Stift in view of Stockinger et al or Gordon et al do not disclose a splash

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condenser as in Claims 28-31. Cattelain teaches a dry crossover duct system comprising gas scrubbing tower as shown below in Figures 1 and 2.

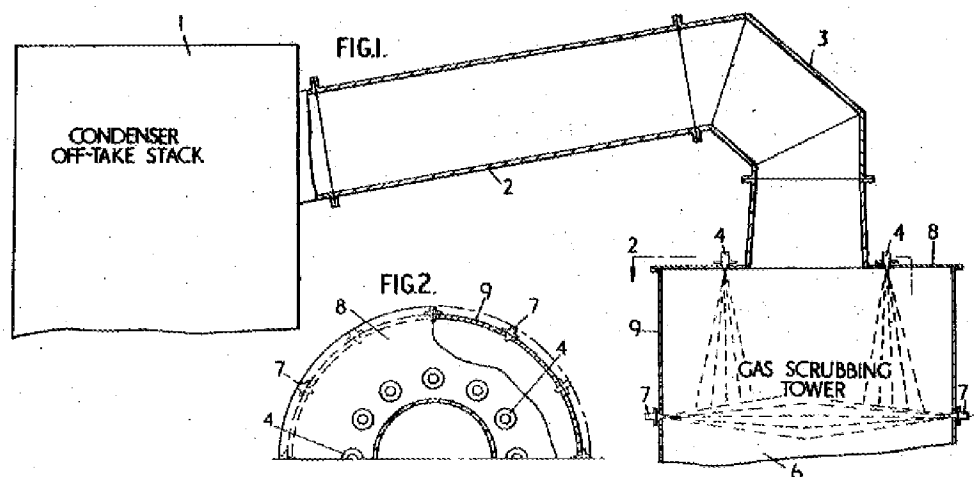


The zinc exit gas is conveyed from a condenser to a scrubbing tower (column 2, lines 11-12). Regarding Claim 29, the main condenser chamber configuration is taught in Figure 1. Regarding Claim 30, 2 and 3 teach the claimed embodiment. Regarding Claim 21, the conduit is taught by 2 and 3 and is substantially lateral. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a the system of Cattelain in the apparatus of Stift in view of Stockinger et al or Gordon et al, since Cattelain teaches that there is no impingement by hot dirty gases on any surfaces in the wet/dry transition zone to cause accretion (column 3, lines 16-18).

Claims 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bailly as applied to claim 17 above, and further in view of Cattelain.

Bailly discloses the invention substantially as claimed. However, Bailly does not disclose a splash condenser as in Claims 28-31. Cattelain teaches a dry crossover duct system comprising gas scrubbing tower as shown below in Figures 1 and 2.





The zinc exit gas is conveyed from a condenser to a scrubbing tower (column 2, lines 11-12). Regarding Claim 29, the main condenser chamber configuration is taught in Figure 1. Regarding Claim 30, 2 and 3 teach the claimed embodiment. Regarding Claim 21, the conduit is taught by 2 and 3 and is substantially lateral. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a the system of Cattelain in the apparatus of Baily, since Cattelain teaches that there is no impingement by hot dirty gases on any surfaces in the wet/dry transition zone to cause accretion (column 3, lines 16-18).

#### *Allowable Subject Matter*

Claim 32 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: neither Baily nor Stift in view of Stockinger et al or Gordon et al disclose or suggest one or more columns provided within said first furnace chamber, each column comprising a plurality of

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vertically orientated, vertically spaced tubes, wherein the cross-sectional area of each tube is smaller than that of an adjacent, lower tube, and wherein the ends of adjacent tubes are arranged so as to provide an annular space there between.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TIMA M. MCGUTHRY-BANKS whose telephone number is (571)272-2744. The examiner can normally be reached on M-F 7:00 am - 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/  
Supervisory Patent Examiner, Art Unit  
1793

/T. M. M./  
Examiner, Art Unit 1793

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